

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) An unified orthodontic ~~treatment planning~~ workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium containing digitized records pertaining to a patient, said digitized records including image data, text data, a proposed set-up for orthodontic treatment of the patient, and a set of software instructions providing graphical user interface tools for providing a user with access to said digitized records for ~~planning~~ evaluating orthodontic treatment of a patient, wherein said set of instructions include:

a) ~~treatment plan instructions providing graphical user interface tools for allowing said user to interactively create a proposed set-up for treatment of the patient, the proposed set-up comprising a proposed three-dimensional position of the dentition and the surrounding orainofacial structure; and~~

[[b]] evaluation instructions providing a series of predetermined steps for guiding a user to interactively evaluate said proposed set-up, said proposed set-up comprising a proposed three-dimensional position of the dentition and the surrounding crainofacial structure, wherein the predetermined steps comprise steps for 1) evaluation of said proposed set-up against boundary conditions for treatment of the patient, the boundary conditions including [[a]] at least a midline, an occlusal plane, a fixed reference object, and an arch form, and 2) evaluation of whether the tooth positions in both arches, and the inter-arch relationship, of the proposed set-up correspond to the treatment goals for the patient[[.]]; said evaluation instructions further comprising instructions for evaluation of a customized arch wire; wherein said customized arch wire is designed for said proposed set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order.

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

Claim 2. (original) The workstation of claim 1, wherein the evaluation instructions further comprise instructions which allow a user to modify the proposed set-up during one or more of said predetermined steps, and wherein modifications made in any one of said one or more predetermined steps are carried over to subsequent steps in said series of predetermined steps.

Claim 3. (original) The workstation of claim 1, wherein said evaluation instructions further comprise instructions which allow a user to navigate through said series of predetermined steps in any order desired by the user.

Claim 4. (original) The workstation of claim 1, wherein the evaluation instructions further comprise instructions which allow a user to compare the position of the teeth in the proposed set-up to associated bone and soft tissue in the craniofacial complex.

Claim 5. (currently amended) The workstation of claim 1, wherein said series of predetermined steps comprise the following evaluation steps of the proposed set-up:

1. checking said midline, said occlusal plane and reference objects, if any,
2. checking the lower arch form and the anterior/posterior (AP) positions of teeth in the lower arch;
3. checking the upper arch form and the AP position of the teeth in the upper arch;
4. checking the overbite and overjet;
5. checking intra-arch tooth alignment;
6. checking intra-arch tooth positions, rotations, contact points, marginal ridges, cusp tips, central grooves and cusp-fossa relations;
7. checking the torque values of at least some of the teeth of the upper and lower arches;
8. checking bite registration;
9. checking gingival architecture structure;

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 4 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

10. checking functional contact points; and
11. checking axial inclination of teeth.

Claim 6. (original) The workstation of claim 5, wherein said evaluation instructions are designed to guide a user to follow steps 1-11 in numerical order, while simultaneously providing the user to navigate from any one of said steps to any other of said steps.

Claim 7. (currently amended) The workstation of claim ~~[[7]]~~ 5, wherein step 4 further comprises instructions for allowing a user to check an occlusion class of said proposed set-up.

Claim 8. (currently amended) A computerized method of ~~planning evaluating a proposed set-up of treatment~~ for an orthodontic patient, comprising the steps of:

providing an orthodontic treatment planning workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium containing digitized records pertaining to a patient, said digitized records including image data, and a set of software instructions providing graphical user interface tools for providing a user with access to said digitized records and for ~~planning evaluating~~ orthodontic treatment of a patient;

~~generating providing~~ ~~[[a]]~~ the proposed set-up for treating the patient, the proposed set-up comprising a proposed three-dimensional position of the dentition and surrounding craniofacial structure of the patient in a post-treatment condition;

conducting an evaluation of said proposed set-up, said evaluation prompted by computer instructions providing a series of predetermined steps for guiding a user to interactively evaluate said proposed set-up, wherein the predetermined steps comprise steps for 1) evaluation of said proposed set-up against boundary conditions for treatment of the patient, the boundary conditions including ~~[[a]]~~ at least a midline, an occlusal plane, a fixed reference object and an arch form, and 2) evaluation of whether the tooth positions in both arches, and the inter-arch relationship, of the proposed set-up

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

correspond to the treatment goals of the patient[[]]; and

conducting an evaluation of a customized arch wire; wherein said customized arch wire is designed for said proposed set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order.

Claim 9. (original) The method of claim 8, wherein said computer instructions are loaded on said workstation and said evaluation is thereby performed by a user using said workstation.

Claim 10. (original) The method of claim 8, wherein said proposed set-up is transmitted over a communications medium to a remote workstation, said remote workstation comprising said computer instructions providing said series of predetermined steps for guiding a user to interactively evaluate said proposed set-up.

Claim 11. (original) The method of claim 8, wherein the computer instructions further comprise instructions which allow a user to modify the proposed set-up during one or more of said predetermined steps, and wherein modifications made in any one of said one or more predetermined steps are carried over to subsequent steps in said series of predetermined steps.

Claim 12. (original) The method of claim 8, wherein the computer instructions further comprise instructions which allow a user to navigate through said series of predetermined steps in any order desired by the user.

Claim 13. (original) The method of claim 8, wherein the evaluation instructions further comprise instructions which allow a user to compare the position of the teeth in the proposed set-up to associated bone and soft tissue in the craniofacial complex.

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 6 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

Claim 14. (currently amended) The method of claim 8, wherein said series of predetermined steps comprise the following evaluation steps of the proposed set-up:

1. checking said midline, said occlusal plane and reference objects, if any,
2. checking the lower arch form and the anterior/posterior (AP) positions of teeth in the lower arch;
3. checking the upper arch form and the AP position of the teeth in the upper arch;
4. checking the overbite and overjet;
5. checking intra-arch tooth alignment;
6. checking intra-arch tooth positions, rotations, contact points, marginal ridges, cusp tips, central grooves and cusp-fossa relations;
7. checking the torque values of at least some of the teeth of the upper and lower arches.
8. checking bite registration;
9. checking gingival ~~architecture~~ structure;
10. checking functional contact points; and
11. checking axial inclination of teeth.

Claim 15. (original) The method of claim 14, wherein said computer instructions are designed to guide a user to follow steps 1-11 in numerical order, while simultaneously providing the user to navigate from any one of said steps to any other of said steps.

Claim 16. (currently amended) An orthodontic treatment planning and evaluation workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium comprising:

said computer storage medium containing digitized records including patient image data, text data pertaining to the patient, and virtual models of said patient's dentition in (1) an initial state, and (2) a treatment set-up state; [[and]]

said computer storage further including a set of software instructions providing graphical user interface tools for access to said digitized records for planning orthodontic

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

treatment of said patient, and a set of computer instructions providing a set of evaluation tools for a user to evaluate, with reference to said patient image data and text data, the treatment set-up state against boundary conditions for treatment of the patient and whether the tooth positions in the treatment set-up corresponds to the treatment goals for the patient[.]; and

said computer storage further including a set of software instructions for evaluation of a customized arch wire; wherein said customized arch wire is designed for said treatment set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order.

Claim 17. (original) The workstation of claim 16, wherein said evaluation tools further comprise automatic tooth feature identification tools enabling said user to automatically identify anatomical features of interest.

Claim 18. (original) The workstation of claim 17, wherein said anatomical features comprise at least one of contact points, marginal ridges, cusp tips, cusp fossa, cuspal grooves, gingival margins and height of gingiva.

Claim 19. (original) The workstation of claim 17, wherein said evaluation tools further comprise icon tools that enable said user to select particular tooth features for identification .

Claim 20. (original) The workstation of claim 16, wherein said evaluation tools further comprise viewing tools enabling said user to interactively manipulate said patient's virtual model in a two-dimensional view, a three-dimensional view, or a combination thereof.

Claim 21. (currently amended) The workstation of claim 20, wherein said viewing tools further enable said user to interactively examine and manipulate any point of

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 8 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

interest on said patient's dentition virtual model, including individual teeth or a sub-set of teeth, in a two-dimensional view, a three-dimensional view, or a combination thereof.

Claim 22. (original) The workstation of claim 20, wherein said viewing tools further enable said user to interactively flatten and manipulate a three-dimensional virtual model of the patient's dentition into a two-dimensional panoramic view and then convert said panoramic view back to a three-dimensional structure by conforming said panoramic view to a desired arch form.

Claim 23. (original) The workstation of claim 16, wherein said evaluation tools further comprise illumination tools enabling said user to visualize otherwise hard to see features.

Claim 24. (original) The workstation of claim 16, wherein said evaluation tools further comprise special visualization tools enabling said user to select, visualize and modify the patient's axial inclinations of crowns and roots of said virtual model of the patient's dentition in at least one of said states.

Claim 25. (original) The workstation of claim 24, wherein said evaluation tools further comprise special tools enabling transfer of said patient's axial inclinations of crowns and roots from x-rays to virtual model of said patient's dentition in at least one of said states.

Claim 26. (original) The workstation of claim 16, wherein said evaluation tools further comprise automatic measurement tools for enabling said user in performing quantitative and qualitative analysis of said virtual model of the patient's dentition in at least one of said states using grids and point-to-point distances.

Claim 27. (original) The workstation of claim 16, wherein said evaluation tools further comprise user selected measurement tools for enabling said user in performing

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 9 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

quantitative and qualitative analysis using grids and point-to-point distances in 2D and 3D.

Claim 28. (original) The workstation of claim 16, wherein said digitized records further comprise a normative database.

Claim 29. (original) The workstation of claim 28, wherein said normative database enables said user to compare said initial state and said treatment set-up state against normative data.

Claim 30. (original) The workstation of claim 28, wherein said normative database enables said user in performing radiographic and photographic analysis of said patient against normative data.

Claim 31. (currently amended) The workstation of claim 16, wherein said evaluation tools further comprise appliance evaluation tools enabling said user in interactively ~~evaluate~~ evaluating appliances including at least one of bracket type, prescription, geometry and position; arch wire geometry and configuration; or a combination thereof, or any other appliance proposed for treatment of the patient, either prior to or following installation of said appliances on said patient's teeth.

Claim 32. (original) The workstation of claim 31, wherein said appliance evaluation tools further enable said practitioner in interactively evaluating bracket positions, arch wire geometry, or a combination thereof.

Claim 33. (original) The workstation of claim 16, wherein said evaluation tools further comprise standardized perspective views to interactively view said patient's dentition comprising frontal, sagittal, or transverse view.

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 10 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

Claim 34. (original) The workstation of claim 16, wherein said digitized records further comprise a library of virtual bracket sets enabling said user in evaluating a prescription for said treatment set-up state and said evaluation tools enabling said practitioner to make adjustments to said prescription by choosing an appropriate bracket from said library and/or changing the position of said bracket relative to a tooth .

Claim 35. (original) The workstation of claim 16, wherein said evaluation tools enable comparisons of tooth positions in said patient's initial state relative to tooth positions in said treatment set-up state.

Claim 36. (currently amended) The workstation of claim 35, wherein said comparisons of tooth positions are done by viewing said ~~initial~~ initial state and proposed treatment set-up side-by-side.

Claim 37. (original) The workstation of claim 35, wherein said comparisons are done by superimposition of said states and providing visual indicia of the change of position from said initial state and said proposed treatment set-up state.

Claim 38. (original) The workstation of claims 35, wherein said comparisons of tooth positions are done automatically.

Claim 39. (original) The workstation of claims 35, wherein said comparisons of tooth positions are done by comparison of position of user selected reference points in the virtual model of the patient's dentition.

Claim 40. (currently amended) A method for orthodontic evaluation facilitated by a treatment planning and evaluation workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium comprising the steps of:

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 11 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

storing in said computer storage medium digitized records including image data, text data, and a virtual model of patient's dentition in an initial state and a treatment set-up state; [[and]]

providing in said computer storage a set of software instructions for graphical user interface tools for access to said digitized records for planning orthodontic treatment of said patient, and a set of computer instructions providing a set of evaluation tools for a user, wherein the predetermined steps comprise steps for 1) evaluation of said proposed set-up against boundary conditions for treatment of the patient, and 2) evaluation of whether the tooth positions in both arches, and the inter-arch relationship, of the proposed set-up correspond to the treatment goals for the patient; and wherein the predetermined steps permit said user to freely select the order in which the evaluation steps are conducted, and wherein when the user selects each step the instructions provide task-specific graphical user interface tools guiding said user in performing evaluation tasks associated with each step; [[and]]

providing in said computer storage a set of software instructions comprising tools for evaluation of a customized arch wire;

evaluating said treatment set-up with the aid of said evaluation tools[.]; and

evaluating said customized arch wire with the aid of said tools for evaluation of a customized arch wire; wherein said customized arch wire is designed for said treatment set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order.

Claim 41. (original) The method of claim 40, further comprising the step of providing tooth feature identification tools enabling said user to automatically visually identify anatomical features of interest.

Claim 42. (currently amended) The method of claim 41, wherein said anatomical features [[on]] include contact points, marginal ridges, cusp tips, cusp fossa, cuspal grooves,

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 12 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

gingival margins, and height of gingiva.

Claim 43. (currently amended) The method of claim 41, further comprising the step of selecting an icon that enables a user to select a particular anatomical feature for identification.

Claim 44. (original) The method of claim 40, further comprising the step of providing viewing tools enabling said user to interactively examine and manipulate any point of interest on said patient's dentition virtual model, including individual teeth or a sub-set of teeth, in a two-dimensional view, a three-dimensional view, or a combination thereof.

Claim 45. (currently amended) The method of claim 44, further comprising the step of ~~providing viewing~~ providing viewing tools enabling said user to interactively manipulate said patient's virtual model in a two-dimensional view, a three-dimensional view, or a combination thereof.

Claim 46. (original) The method of claim 44, wherein said viewing tools further enable said user to interactively flatten and manipulate a three-dimensional virtual model of the patient's dentition into a two-dimensional panoramic view and then convert said panoramic view back to a three-dimensional structure by conforming said panoramic view to a desired arch form.

Claim 47. (original) The method of claim 40, further comprising the step of providing tools that simulate changes in illumination of said virtual model of the dentition to highlight otherwise hard to see features.

Claim 48. (original) The method of claim 40, wherein said evaluation tools further comprise visualization tools enabling said user to select, visualize and modify the patient's axial inclinations of crowns and roots of said virtual model of the patient's

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 13 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

dentition in at least one of said states.

Claim 49. (original) The method of claim 48, wherein said evaluation tools further comprise tools enabling transfer of said patient's axial inclinations of crowns and roots from x-rays to said virtual model of said patient's dentition in at least one of said states.

Claim 50. (original) The method of claim 40, wherein said evaluation tools further comprise automatic measurement tools for enabling said user in performing quantitative and qualitative analysis of said virtual model of the patient's dentition in at least one of said states using grids and point-to-point distances.

Claim 51. (original) The method of claim 40, wherein said evaluation tools further comprise user selected measurement tools for enabling said user in performing quantitative and qualitative analysis using grids and point-to-point distances in 2D and 3D.

Claim 52. (original) The method of claim 40, wherein said digitized records further comprise a normative database.

Claim 53. (original) The method of claims 52, further comprising the step of comparing said initial state and said treatment set-up state against said normative data.

Claim 54. (original) The method of claim 53, wherein said normative database enables said user in performing radiographic and photographic analysis of said patient against normative data.

Claim 55. (currently amended) The method of claim 40, further comprising the step of performing an appliance evaluation, wherein said user interactively evaluates appliances including at least one of bracket positions, ~~arch-wire geometry~~, or a

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 14 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

combination of at least one of bracket positions and arch wire geometry ~~thereof~~, or any other appliance fixture, either prior to or following installation of said appliances on said patient's teeth.

Claim 56. (currently amended) The method of claim ~~[[55]]~~40, wherein said ~~appliance~~ customized arch wire evaluation step further comprises interactively evaluating ~~bracket positions, said customized arch wire geometry, or a combination thereof~~ force system.

Claim 57. (original) The method of claim 40, wherein said evaluation further comprises providing standardized perspective views to interactively view said patient's dentition comprising frontal, sagittal, or transverse view.

Claim 58. (original) The method of claim 40, wherein said digitized records further comprise a library of virtual bracket sets enabling said user in evaluating a prescription for said treatment set-up state and said evaluation tools enabling said practitioner to make adjustments to said prescription by choosing an appropriate bracket from said library and/or changing the position of said bracket relative to a tooth

Claim 59. (original) The method of claim 40, wherein said evaluation tools enable comparisons of tooth positions in said patient's initial state relative to tooth positions in said treatment set-up state.

Claim 60. (original) The method of claim 59, wherein said comparisons of tooth positions are done by viewing said initial state and proposed treatment set-up side-by-side

Claim 61. (original) The method of claim 59, wherein said comparisons are done by superimposition of said states and providing visual indicia of the change of position from said initial state and said proposed treatment set-up state.

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 15 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

Claim 62. (original) The method of claims 59, wherein said comparisons of tooth positions are done automatically.

Claim 63. (original) The method of claims 59, wherein said comparisons of tooth positions are done by comparison of position of user selected reference points in the virtual model of the patient's dentition.

Claim 64. (currently amended) A method for orthodontic treatment evaluation for a patient facilitated by a treatment planning and evaluation workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium comprising the steps of:

(a) storing in said computer storage medium digitized records pertaining to the patient including image data including 2d and 3D radiographic data, photographic data and 3D data sets comprising virtual models of the patient's dentition in an initial state and a treatment set-up state;

(b) providing in said computer storage a set of software instructions for graphical user interface tools for access to said digitized records for treatment set-up evaluation of said patient, and a set of computer instructions providing a set of treatment evaluation tools for a user;

(c) with the aid of said evaluation tools, evaluating said patient's treatment set-up by performing the following steps:

1. checking said midline, said occlusal plane and reference objects, if any,
2. checking the lower arch form and the anterior/posterior (AP) positions of teeth in the lower arch;
3. checking the upper arch form and the AP position of the teeth in the upper arch;
4. checking the overbite and overjet;
5. checking intra-arch tooth alignment;
6. checking intra-arch tooth positions, rotations, contact points, marginal ridges,

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 16 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

cuspid tips, central grooves, and cuspid-fossa relations;

7. checking the torque values of at least some of the teeth of the upper and lower arches;

8. checking bite registration;

9. checking gingival architecture structure;

10. checking functional contact points; and

11. checking axial inclination of teeth;

wherein steps (1) – (11) are done in the order listed above or in any other order selected by said user, and repeated as deemed necessary by said user and wherein steps (1) – (11) further include making comparisons and making modifications in the treatment set-up as and when necessary; [[and]]

(d) further providing in said computer storage a set of software instructions comprising tools for evaluation of a customized arch wire;

(e) evaluating said customized arch wire with the aid of said tools for evaluation of a customized arch wire; wherein said customized arch wire is designed for said treatment set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order; and

(f) accepting said treatment set-up when results in steps (1) - (11) in step (c) and step (e) are acceptable; otherwise rejecting said treatment set-up.

Claim 65. (original) The method of claim 64, further comprising the step of comparing said states against digital records for the patient, , said records comprising at least one of scan data, dentition model, intra-oral photographs, x-rays, panorex X-ray, and lateral cephal X-ray.

Claim 66. (original) The method of claim 65, further comprising comparing said states against a dentition model derived from a physical model of the patient's dentition.

Claim 67. (original) The method of claim 64, further comprising the steps of evaluating

OraMetric, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 17 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

individual virtual teeth in at least one of the virtual models of the patient's dentition from a morphometric perspective and providing tools by which changes in the shape of the teeth may be simulated.

Claim 68. (currently amended) The method of claim 64, further comprising providing interactive and communications features in said workstation wherein one or more specialists may remotely examine said patient's records and conduct a remote evaluation of said treatment set-up state.[[.]]

Claim 69. (original) The method of claim 64, wherein said patient's digitized records further include said patient's pre-processed dentition data and further comprising the steps comparing said patient's pre-processed dentition data with said patient's post-processed data.

Claim 70. (original) The method of claims 69, wherein step (c) is further conducted using said patient's pre-processed data.

Claim 71. (currently amended) A method for orthodontic evaluation for appliances of a patient facilitated by a treatment planning workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium comprising the steps of:

storing in said computer storage medium digitized records including image data and virtual dentition model of patient's initial state and treatment set-up state, said medium further storing [[a]] virtual appliances;

providing in said computer storage a set of software instructions for graphical user interface tools for access to said digitized records for treatment set-up evaluation of said patient, and a set of computer instructions providing a set of treatment set-up evaluation tools for [[a]] a user; and

Appl. No. 10/620,231

Amdt. Dated Aug. 22, 2006

Reply to Office action of 02/23/2006

with the aid of said treatment set-up evaluation tools evaluating appliances selected and positioned for use in achieving said treatment-set-up state[.]; wherein said appliances include customized arch wires; said customized arch wires having been designed for said treatment set-up; and wherein said customized arch wires include bends of 1st order, 2nd order, and 3rd order.

Claim 72. (currently amended) The method of claim 71, wherein said appliances include brackets ~~and arch wires~~, said appliance images include images of said brackets ~~and said arch wires~~, and said appliance libraries include templates and specifications of said brackets ~~and said arch wires~~.

Claim 73. (currently amended) The method of claims ~~[[71]]~~72, wherein said digitized records include said patient's scan data and photographs and further comprising the steps of evaluating said brackets against said bracket libraries, said scan data, and said photographs.

Claim 74. (currently amended) The method of claims 71, wherein said digitized records include said patient's scan data and photographs and further comprising the steps of ~~evaluating said arch wires bends of 1st order, 2nd order, and 3rd order;~~ evaluating said arch wires force systems, and evaluating said arch wires against standard templates from said appliance libraries.

Claim 75. (currently amended) The method of claims 73, wherein said evaluation of said brackets and said customized arch wires is done iteratively and in combination of each other.

Claim 76. (currently amended) A method for orthodontic treatment set-up evaluation for individual teeth of a patient facilitated by a treatment planning workstation comprising a computing platform having a graphical user interface, a processor and a

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 19 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

computer storage medium comprising the steps of:

storing in said computer storage medium digitized records including image data and virtual models of patient's dentition in an initial state and treatment set-up state;

providing in said computer storage a set of software instructions for graphical user interface tools for access to said digitized records for treatment set-up evaluation of said patient, and a set of computer instructions providing a set of treatment set-up evaluation tools for a user, said evaluation tools for evaluation of said proposed set-up state against boundary conditions for treatment of the patient, the boundary conditions including a least a midline, an occlusal plane, a fixed reference object, and an arch form, and 2) evaluation of whether the tooth positions in both arches, and the inter-arch relationship, of the proposed set-up correspond to the treatment goals for the patient.; [[and]] with the aid of said treatment set-up evaluation tools evaluating said patient's individual teeth in the treatment set-up state[.];

further providing in said computer storage a set of software instructions comprising tools for evaluation of a customized arch wire; and

evaluating said customized arch wire with the aid of said tools for evaluation of a customized arch wire; wherein said customized arch wire is designed for said treatment set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order.

Claim 77. (original) The method of claim 76, wherein said individual teeth include crown and root, and said patient's records include true anatomy images of said teeth and x-rays of said teeth's true roots or representations

Claim 78. (original) The method of claim 77, further comprising the steps of defining the orientation of said individual teeth in the x, y, and z planes automatically or through selection by user from said patient's x-rays or from photographs or clinical examinations or through derivation from models by placing a reference line below and touching said crown away from said root, drawing an axis through said crown and said root in the

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 20 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

center of said tooth, and measuring inclination of said axis relative to opposing tooth and relative to adjacent tooth, wherein the step of measuring inclination of said axis includes measuring said inclination in x, y, and z planes.

Claim 79. (original) The method of claim 78, wherein the placement of said reference line and said axis are done automatically by said treatment planning workstation.

Claim 80. (original) The method of claim 78, wherein the placement of said reference line and said axis are selected by said practitioner or user.

Claim 81. (original) The method of claim 78, wherein said individual teeth can be represented by reference lines for orientation viewed as points or as lines.

Claim 82. (currently amended) A method for orthodontic treatment set-up evaluation of a patient facilitated by a treatment planning workstation comprising a computing platform having a graphical user interface, a processor and a computer storage medium comprising the steps of:

storing in said computer storage medium digitized records including image data and virtual models of patient's dentition in an initial state and a treatment set-up state;

providing in said computer storage a set of software instructions for graphical user interface tools for access to said digitized records for treatment set-up evaluation of said patient, and a set of computer instructions providing a set of treatment set-up evaluation tools for a user; [[and]]

with the aid of said treatment set-up evaluation tools viewing said patient's dentition in a treatment set-up state in an occluded state; ~~and providing communications features in said workstation wherein multiple practitioners may evaluate said treatment set-up over the Internet.~~

further providing in said computer storage a set of software instructions comprising tools for evaluation of a customized arch wire;

OraMetrix, Inc.
2350 Campbell Creek Blvd., Suite 400
Richardson, Texas 75082

Page 21 of 50

Appl. No. 10/620,231
Amdt. Dated Aug. 22, 2006
Reply to Office action of 02/23/2006

evaluating said customized arch wire with the aid of said tools for evaluation of a customized arch wire; wherein said customized arch wire is designed for said treatment set-up; and wherein said evaluation of said customized arch wire includes evaluation of bends in said customized arch wire of 1st order, 2nd order, and 3rd order; and providing communications features in said workstation wherein multiple practitioners may evaluate said treatment set-up and customized arch wire design over the Internet.

Claim 83. (original) The workstation of claim 16, wherein said memory further stores a virtual model of the patient's dentition during the course of treatment and a virtual model of the patient's dentition at the conclusion of treatment.

Claim 84. (original) The method of claim 40, wherein said memory further stores a virtual model of the patient's dentition during the course of treatment and a virtual model of the patient's dentition at the conclusion of treatment.

Claim 85. (original) The method of claim 84, wherein the method further comprises the step of performing an evaluation of the treatment set-up using the evaluation tools based on the progress of treatment as indicated by the virtual model of the patient's dentition during the course of treatment.

Claim 86. (original) The method of claim 84, wherein the method further comprises the step of performing an evaluation of the virtual model of the patient's dentition at the conclusion of treatment using the evaluation tools.